



FILE NO.

SERVICE MANUAL

LCD TV

LCD-26XR7

PRODUCT CODE No.

1 682 343 90: PAL/SECAM

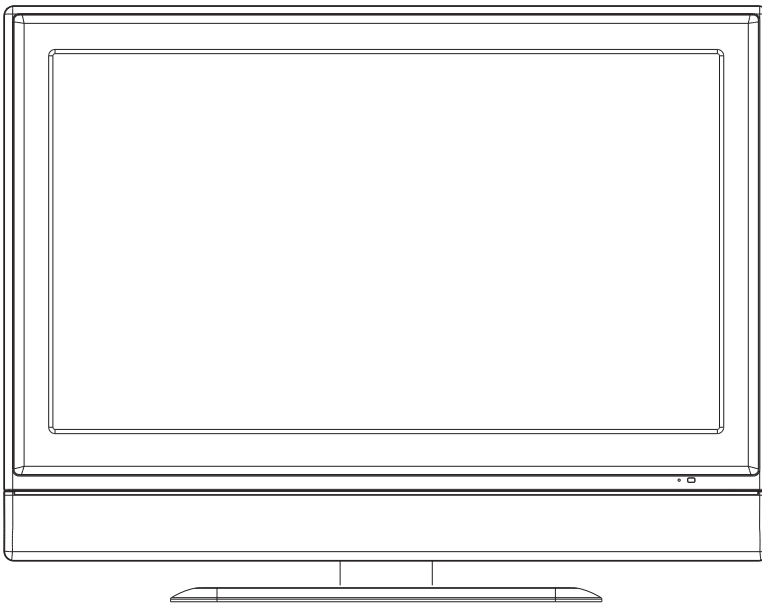
1 682 343 91: SANYO India

LCD-32XR7

PRODUCT CODE No.

1 682 343 93: PAL/SECAM

1 682 344 13: SANYO India



REFERENCE No.:SM0915008

CONTENTS

Safety instructions.....	1
Adjustment instruction	3
working principle analysis.....	6
block diagram.....	7
IC block diagram.....	8
Wiring diagram	12
Troubleshooting guide	13
Schematic diagram.....	20
APPENDIX-A: Assembly list	
APPENDIX-B: Exploded view	

Attention: This service manual is only for service personnel to take reference with. Before servicing please read the following points carefully.

Safety precautions

1. Instructions

Be sure to switch off the power supply before replacing or welding any components or inserting/plugging in connection wire. Anti static measures to be taken (throughout the entire production process!):

- a) Do not touch here and there by hand at will;
- b) Be sure to use anti static electric iron;
- c) It's a must for the welder to wear anti static gloves.

Please refer to the detailed list before replacing components that have special safety requirements. Do not change the specs and type at will.

2. Points for attention in servicing of LCD

2.1 Screens are different from one model to another and therefore not interchangeable. Be sure to use the screen of the original model for replacement.

2.2 The operation voltage of LCD screen is 700-825V. Be sure to take proper measures in protecting yourself and the machine when testing the system in the course of normal operation or right after the power is switched off. Please do not touch the circuit or the metal part of the module that is in operation mode. Relevant operation is possible only one minute after the power is switched off.

2.3 Do not use any adapter that is not identical with the TV set. Otherwise it will cause fire or damage to the set.

2.4 Never operate the set or do any installation work in bad environment such as wet bathroom, laundry, kitchen, or nearby fire source, heating equipment and devices or exposure to sunlight etc. Otherwise bad effect will result.

2.5 If any foreign substance such as water, liquid, metal slices or other matters happens to fall into the module, be sure to cut the power off immediately and do not move anything on the module lest it should cause fire or electric shock due to contact with the high voltage or short circuit.

2.6 Should there be smoke, abnormal smell or sound from the module, please shut the power off at once. Likewise, if the screen is not working after the power is on or in the course of operation, the power must be cut off immediately and no more operation is allowed under the same condition.

2.7 Do not pull out or plug in the connection wire when the module is in operation or just after the power is off because in this case relatively high voltage still remains in the capacitor of the driving circuit. Please wait at least one minute before the pulling out or plugging in the connection wire.

2.8 When operating or installing LCD please don't subject the LCD components to bending, twisting or extrusion, collision lest mishap should result.

2.9 As most of the circuitry in LCD TV set is composed of CMOS integrated circuits, it's necessary to pay attention to anti statics. Before servicing LCD TV make sure to take anti static measure and ensure full grounding for all the parts that have to be grounded.

2.10 There are lots of connection wires between parts behind the LCD screen. When servicing or moving the set please take care not to touch or scratch them. Once they are damaged the screen

would be unable to work and no way to get it repaired.

If the connection wires, connectors or components fixed by the thermotropic glue need to disengage when service, please soak the thermotropic glue into the alcohol and then pull them out in case of damage.

2.11 Special care must be taken in transporting or handling it. Exquisite shock vibration may lead to breakage of screen glass or damage to driving circuit. Therefore it must be packed in a strong case before the transportation or handling.

2.12 For the storage make sure to put it in a place where the environment can be controlled so as to prevent the temperature and humidity from exceeding the limits as specified in the manual. For prolonged storage, it is necessary to house it in an anti-moisture bag and put them altogether in one place. The ambient conditions are tabulated as follows:

Temperature	Scope for operation	0 ~ +50 °C
	Scope for storage	-20 ~ +60 °C
Humidity	Scope for operation	20% ~ 85%
	Scope for storage	10% ~ 90%

2.13 Display of a fixed picture for a long time may result in appearance of picture residue on the screen, as commonly called "ghost shadow". The extent of the residual picture varies with the maker of LCD screen. This phenomenon doesn't represent failure. This "ghost shadow" may remain in the picture for a period of time (several minutes). But when operating it please avoid displaying still picture in high brightness for a long time.

3. Points for attention during installation

3.1 The front panel of LCD screen is of glass. When installing it please make sure to put it in place.

3.2 For service or installation it's necessary to use specified screw lest it should damage the screen.

3.3 Be sure to take anti dust measures. Any foreign substance that happens to fall down between the screen and the glass will affect the receiving and viewing effect

3.4 When dismantling or mounting the protective partition plate that is used for anti vibration and insulation please take care to keep it in intactness so as to avoid hidden trouble.

3.5 Be sure to protect the cabinet from damage or scratch during service, dismantling or mounting.

Alignment instructions

1. Test equipment

PM5518 (video signal generator)

VG-849 (VGA signal generator)

CA210 (white balancer)

2 Alignment flow-chart

The alignment flow-chart is shown as fig-1

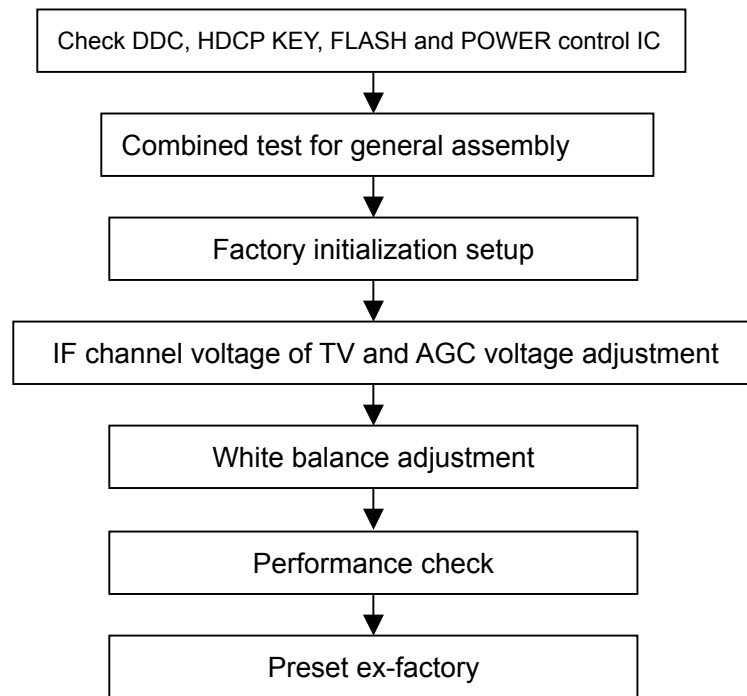


Fig-1 adjustment flow-chart

3 Unit adjustments

Connect all the boards according to wiring diagram, connect with power and observe the display.

Method for entering factory menu: press “INPUT”, “2”, “5”, “8” and “0” in turn to enter factory menu; press “CH+” and “CH-” to select adjustment items and press “VOL+” and “VOL-” to adjust value items, press “MENU” continuously to exit.

3.1 Initialization

Enter factory menu, select “OPTION” and “HOTEL OPTION” sub-menu, adjustment of items to see table1.

Table1 sub-menu adjustment

Items	Preset	Introduce
HOTEL	0	1: HOTEL OPTION of factory menu is optional 0: HOTEL OPTION of factory menu is not optional
LOGO	1	1: display LOGO in no signal or turn on 0: no LOGO display
ADC PRESCALE	00A	Adjust according different power consumption
SIF PRESCALE	000	Adjust according different power consumption

BACK LIGHT	28	Adjust according different screen
ALL COLOR	1	1: white balance of each channel auto offset based on the HDMI white balance 0: white balance of each channel adjust the offset base separately
ISP	0	0: no unit upgrade on the assembly line 1: unit upgrade on the assembly line
NO STANDY	00	01: turn on; 00: memory function of turn on; 10: standby
INIT VOLUME	0-100	Volume of turn on
INIT CHANNEL	1-200	Channel of turn on
INIT SRC	Source	Source of turn on
EEPROM-MEMORAY RECALL	>	EEPROM Initialization (operate when EEPROM data chaos)

3.2 Adjustment for AFT voltage and AGC voltage of IF channel in TV

3.2.1 IF AFC adjustment

Disconnect J401(B face), input 38.9MHz PAL signal of 80dB from J401 near the socket, Adjust L404 to value 0.9V of TP402. Enter factory menu, adjust TDA4470 from BG to LL, input 33.9MHz SECAM signal of 80dB, adjust RP402 to value 0.9V of TP402, then wed J401.

3.2.2 IF AGC adjustment

Input 184.25MHz RF signal of 60DB from RF terminal, adjust RP401 to value 4V of TP404 and there should be no obvious snowy picture. Increase the signal to 90DBV and it should be display normally and no obvious noise.

3.3 White balance adjustment

3.3.1 white balance adjustment of HDMI

a. Input VG-848 signal from HDMI: TIMING854(800* 600/60Hz) and eighth level gray-scale signal of PAT920. Use color analyzer CA210 to adjust white balance.

b. Enter submenu of COLOR TEMP., Select 9300k of color temperature

c. Fixed value of B GAIN, adjust R GAIN and G GAIN, let the color coordinate of the seventh level be 285 and 293. Fixed value of B OFF, adjust R OFF and G OFF, let the color coordinate of second level be 285 and 293 and the brightness be about 3nit-10nit. Adjustment R GAIN, G GAIN, R OFF and G OFF repeatedly until the value of the two levels gray-scale be 285 and 293.

3.3.2 VGA/YPBPR/AV white balance check and correct

a. Input VG-848 signal of VGA: TIMING854(800* 600/60Hz) (PATIERN:CROSS) and auto adjust to full screen, then input PAT948 black/white signal, enter factory menu ADC ADJ, select AUTOTUNE and wait for OK display. Input PAT920(8 gray levels), check if the white balance is normal, if not, set ALL COLOR to 0 and fine adjust according the method of 3.3.1

b. connect VG-848 signal of YPBPR to YPBPR terminal and input TIMING972(1080i/60HZ) color bar of PAT908(include black/white bar), Enter submenu of ADC ADJ, Select AUTOTUNE and wait for OK display. Input PAT920(8 gray levels), check if the white balance is normal, if not, set ALL COLOR to 0 and fine adjust according the method of 3.3.2

c. Input AV signal(PM5518, 8 gray levels) to VIDEO terminal, check if the white balance is normal, if not, set ALL COLOR to 0 and fine adjust according the method of 3.3.2

Note: it can't set back to 1 once ALL COLOR changes to 0.

4 Software upgrade

When software upgrading please enter factory menu first, enter ISP of OPTION, set ISP to 1 and you can begin to upgrade. After upgrade finished, it needs to set ISP back to 0. If the picture can't display when upgrading, it needs to web J1 of 01S board. Please disconnect J1 again after upgrading.

5 Performance check

5.1 TV function

Enter searching menu → auto search, connect RF-TV terminal with central signal source and check if the picture is normal, if there are channels be skipped. Check TXT and parental control.

5.2 AV/S, YpbPr terminals

Input AV/S, YPbPr/YCbCr HD signal, check if it is normal.

5.3 VGA terminal

Insert VGA terminal, input VGA format signal of 640X480@60 Hz and check if the display is normal.

5.4 HDMI terminal

Insert HDMI terminal, input signal of 640 X 480@60 Hz signal and check if the display is normal.

5.5 check sound channel

Check the speaker and headphone of each channel.

5.6 RS232 terminal

Insert earphone to COM terminal and check if the long-distance control function is normal.

5.7 other function check

Check the turn on/turn off timer, asleep timer, picture/sound mode, OSD, freeze/mute, stereo, ect.

5.8 presetting before ex-factory

Item	Setting
PICTURE MODE	STANDARD
COLOR MODE	NORMAL
NR	WEAK
ZOOM	FULL
SOUND MODE	STANDARD
AVC	OFF

Item	Setting
BALANCE	50
VOLUME	50
SLEEP TIMER	OFF
TTX LANGUAGE	WEST
BLUE SCREEN	OFF

Item	Setting
OSD LANGUAGE	English
OSD HPOSITION	50
OSD VPOSITION	50
OSD HALFTONE	50
OSD DURATION	15

Working principle analysis of the unit

The RF signal received by antenna will be sent to tuner TUN401, then IF signal will be obtained through high amplifier and mixed frequency, through pre-intermediate amplified by V408, then it will be sent to acoustic surface-wave Z407 to do IF filter and get better IF characteristics, then it will be sent to N404 (TDA4470) to do intermediate amplification, phase-locked loop VCO and synchronous wave detection to get video signal TV-V; after pre-intermediate amplification IF will also be sent to acoustic surface-wave Z406 to do filter at the same time, then it will be sent to N404 to do intermediate amplification and output the second sound intermediate frequency signal (TV-SIF).

The TV-V signal output from TDA4470 together with TV-SIF will be sent to main IC NS4(MST9E88L).

Video signals of AV1/S, VGA, YPbPr and HDMI will be sent to MST9E88L, too.

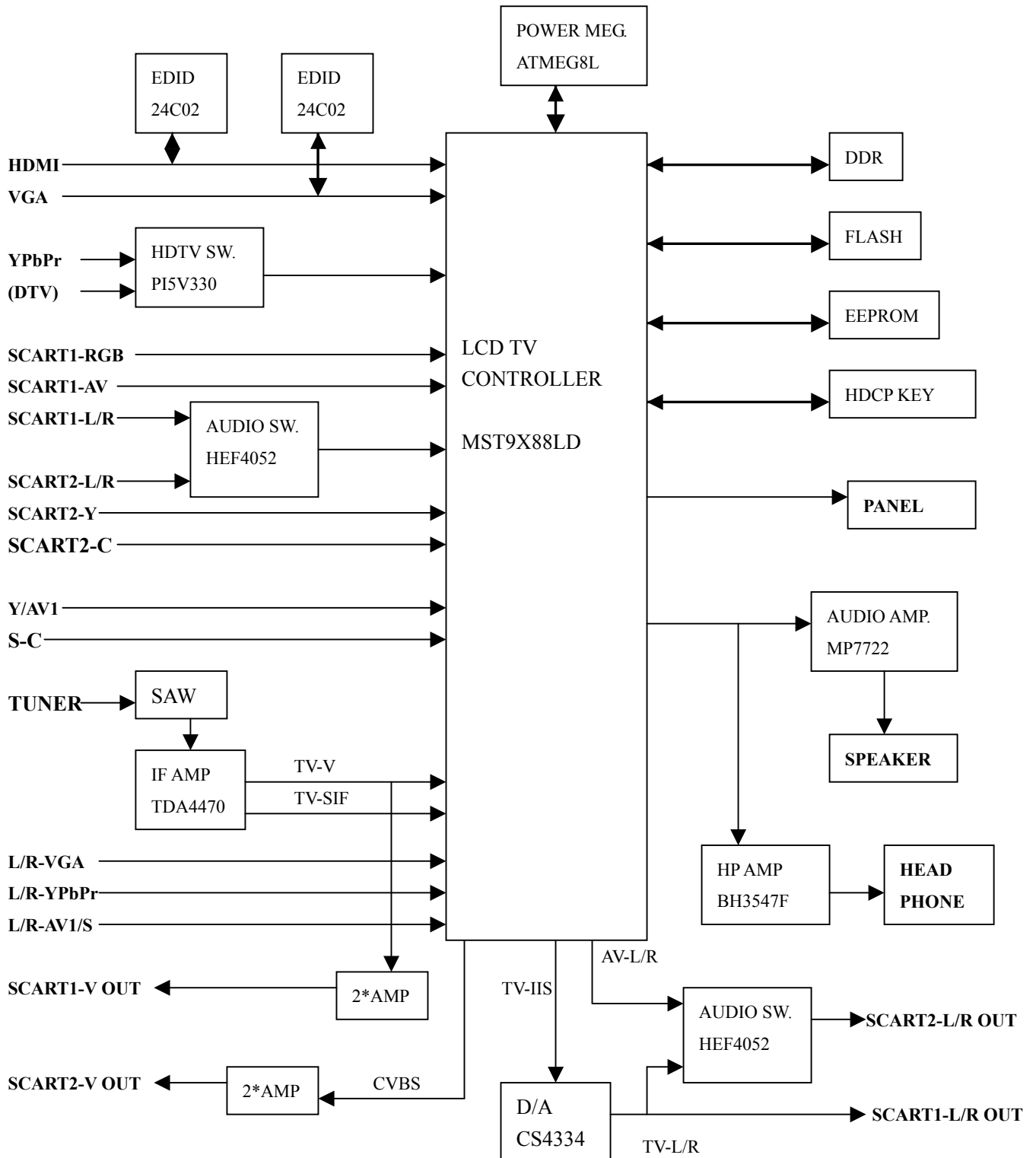
Video RGB of SCART1 and S-Y, S-C of SCART2 will still be sent to MST9E88L, and the audio signal of them via audio switch N302(HEF4052BT) selection after also sent to MST9E88L.

The main IC NS4(MST9E88L) is a high performance and fully integrated IC, which can realize HDMI processing, video demodulating, video switch selection, A/D and D/A conversion, interlace/de-interlace processing, modes conversion, OSD and low-voltage differential output, ect. And it also has functions of audio selection, processing and MCU.

The video signal via MST9E88L processing, output 4 pairs differential signal and 1 pair clock signal for LCD panel display. TV-V output from TDA4470 via double video amplifying, it will be sent to SCART1 for AV-OUT. AV processed by MST9E88L via double video amplifying will be sent to SCART2 for AV-OUT, too.

Audio signal via MST9E88L processing will be sent to sound amplifier N405 (MP7722DF) amplifying to speaker. The audio also sent to earphone amplifier N406(BH3547F) amplifying to earphone. TV audio signal will be sent to D/A converter NS6(DS4344) through I2S bus converting to analog audio signal TV-L/R, then sent to SCART1 for AV-OUT. At the same time, TV-L/R together with AV-L/R processed by MST9E88L will be sent to audio switch NS8(HEF4052BT), after selecting to SCART2 for AV-OUT.

Block diagram



2. MP7722DF

The MP7722 is a stereo 20W Class D Audio Amplifier. It is one of MPS's second generation of fully integrated audio amplifiers which dramatically reduces solution size by integrating the following:

180mΩ power MOSFETs

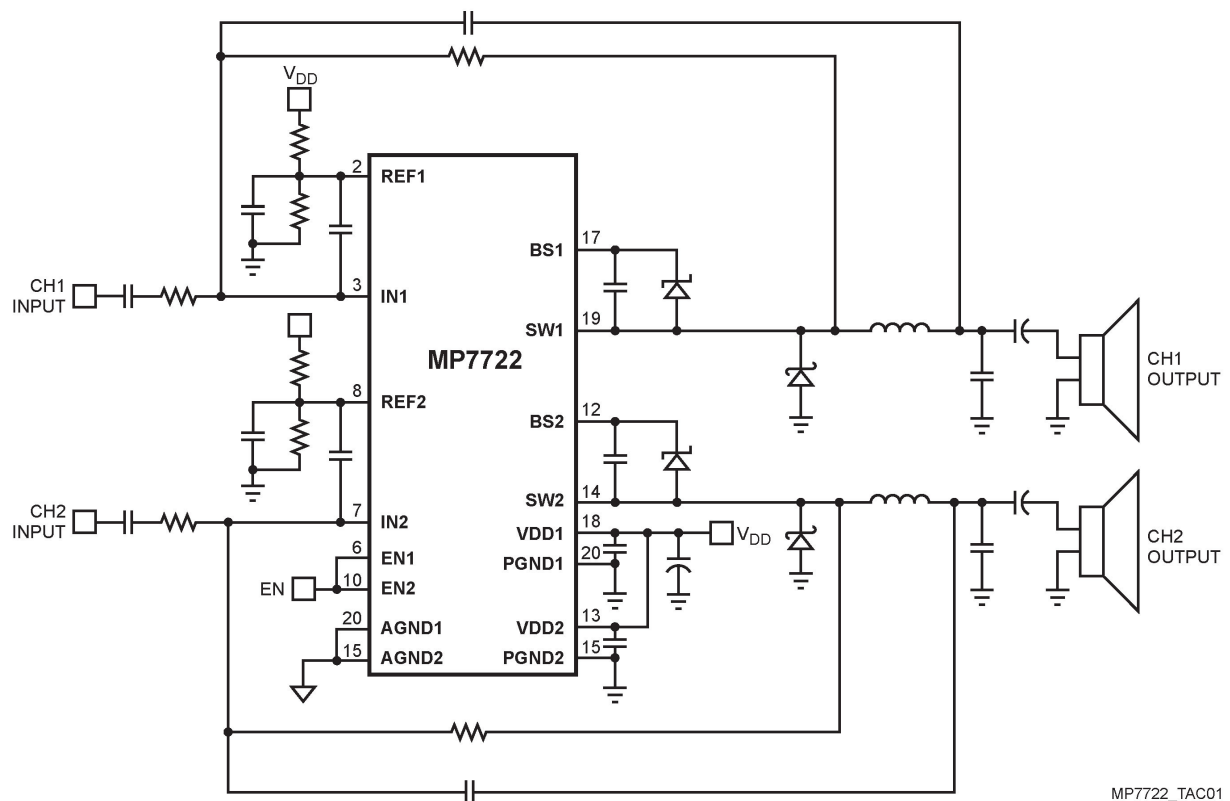
Startup / Shutdown pop elimination

Short circuit protection

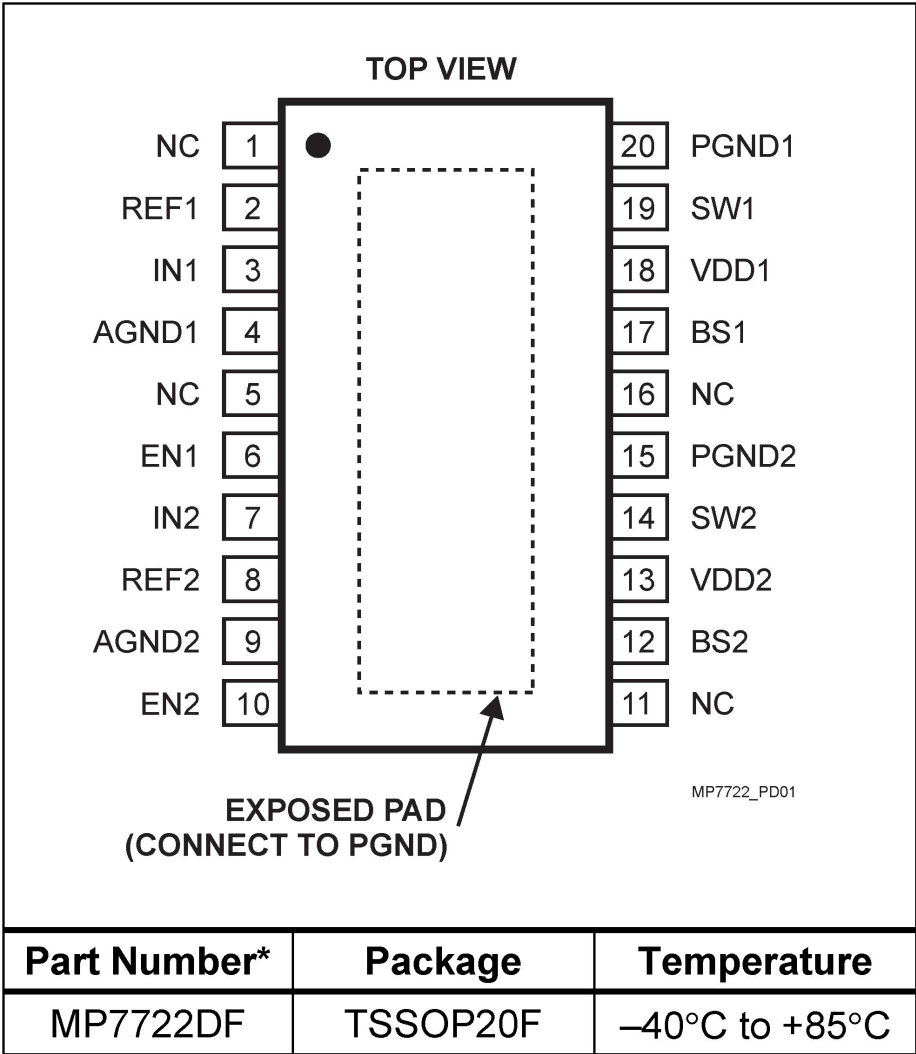
Mute / Standby

The MP7722 utilizes a single ended output structure capable of delivering 2 x 20W into 4Ω speakers. MPS Class D Audio Amplifiers exhibit the high fidelity of a Class A/B amplifier at efficiencies greater than 90%. The circuit is based on the MPS' proprietary variable frequency topology that delivers low distortion, fast response time and operates on a single power supply.

TYPICAL APPLICATION



PACKAGE REFERENCE



3. TDA4470

The TDA4470 is an integrated bipolar circuit for multi-standard video/sound IF(VIF/SIF) signal processing in TV/VCR and multimedia applications. The circuit processed all TV video IF signals with negative modulation (e.g., B/G standard), positive modulation (e.g., L standard) and the AM, FM/NICAM sound IF signals.

Block Diagram

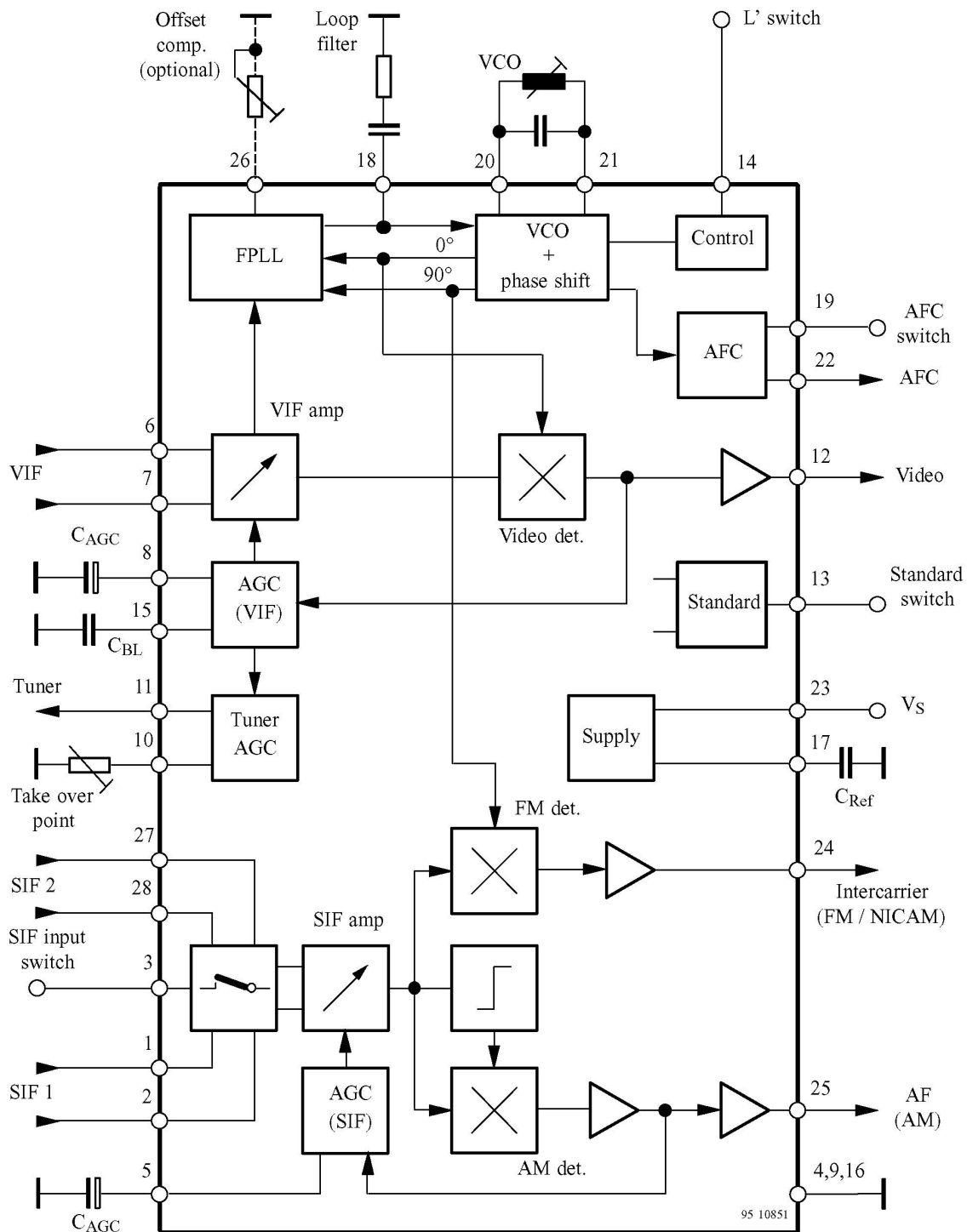


Figure 1. Block diagram

Pin Description

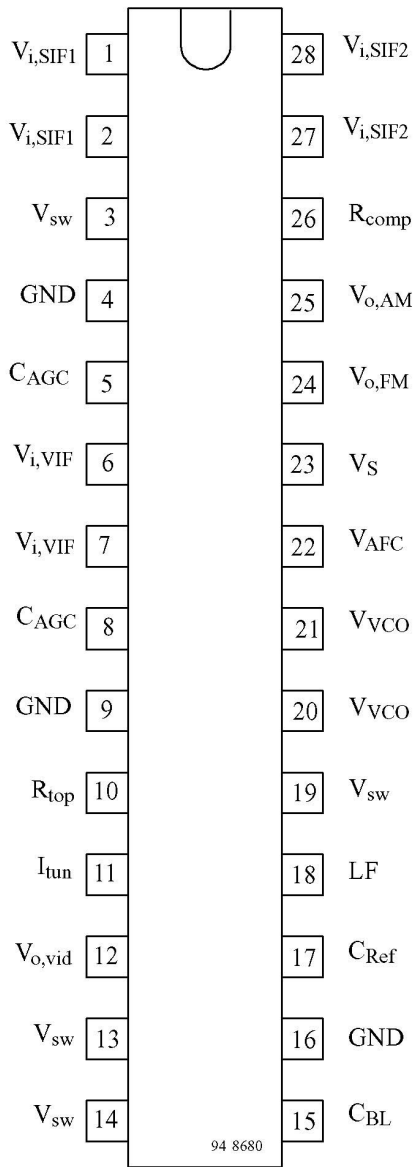
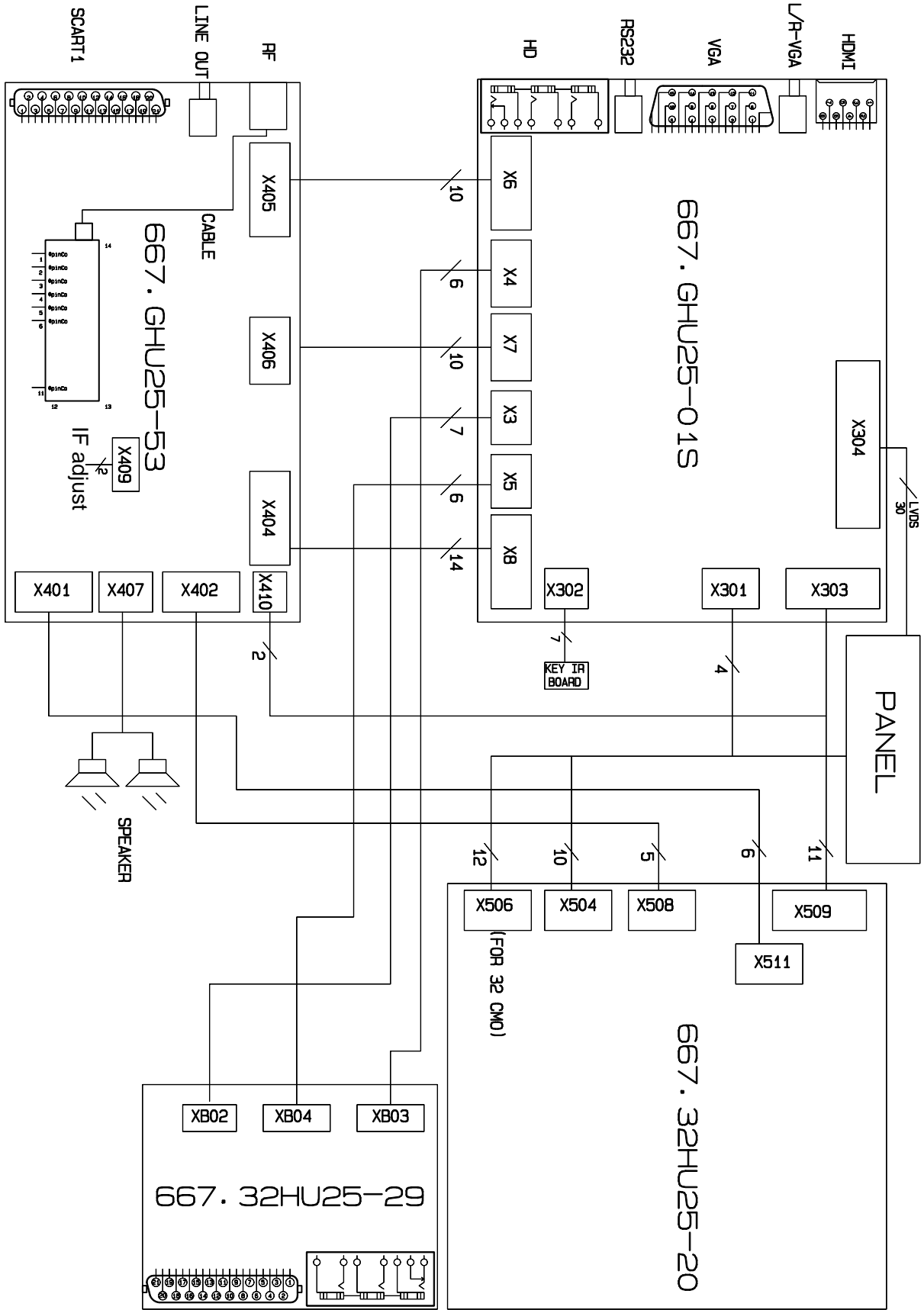


Figure 2. Pinning

Pin	Symbol	Function
1, 2	$V_{i, SIF1}$	SIF1 input (symmetrical)
3	V_{sw}	Input selector switch
4, 9, 16	GND	Ground
5	C_{AGC}	SIF-AGC (time constant)
6, 7	$V_{i, VIF}$	VIF input (symmetrical)
8	C_{AGC}	VIF-AGC (time constant)
10	R_{top}	Take over point, tuner AGC
11	I_{tun}	Tuner AGC output current
12	$V_{o,vid}$	Video output
13	V_{SW}	Standard switch
14	V_{SW}	L' switch
15	C_{bl}	Black level capacitor
17	C_{ref}	Internal reference voltage
18	LF	Loop filter
19	V_{sw}	AFC switch
20, 21	V_{VCO}	VCO circuit
22	V_{AFC}	AFC output
23	V_S	Supply voltage
24	$V_{O, FM}$	Intercarrier output
25	$V_{O, AM}$	AF output – AM sound
26	R_{comp}	Offset compensation
27, 28	$V_{i, SIF2}$	SIF 2 input (symmetrical)

Wiring diagram



Trouble shooting

1. Fault clearance

Before servicing please check to find the possible causes of the troubles according to the table below.

1.1 Antenna (signal):

Picture is out of focus or jumping	<ul style="list-style-type: none"> ● Bad status in signal receiving ● Poor signal ● Check if there are failures with the electrical connector or the antenna. ● Check if the antenna is properly connected.
Fringe in picture	<ul style="list-style-type: none"> ● Check if the antenna is correctly oriented. ● Maybe there is electric wave reflected from hilltop or building.
Picture is interfered by stripe shaped bright spots	<ul style="list-style-type: none"> ● Possibly due to interference from automobile, train, high voltage transmission line, neon lamp etc. ● Maybe there is interference between antenna and power supply line. Please try to separate them in a longer distance. ● Maybe the shielded-layer of signal wire is not connected properly to the connector.
There appear streaks or light color on the screen	<ul style="list-style-type: none"> ● Check if interfered by other equipment and if interfered possibly by the equipment like transmitting antenna, non-professional radio station and cellular phone.

1.2 TV set:

Symptoms	Possible cause
Unable to switch the power on	<ul style="list-style-type: none"> ● Check to see if the power plug has been inserted properly into the socket.
No picture and sound	<ul style="list-style-type: none"> ● Check to see if the power supply of liquid crystal TV has been switched on. (As can be indicated by the red LED at the front of the TV set) ● See if it's receiving the signal that is transmitted from other source than the station ● Check if it's connected to the wrong terminal or if the input mode is correct. ● Check if the signal cable connection between video frequency source and the liquid crystal TV set is correct.
Deterioration of color phase or color tone	<ul style="list-style-type: none"> ● Check if all the picture setups have been corrected.
Screen position or size is not proper	<ul style="list-style-type: none"> ● Check is the screen position and size is correctly set up.
Picture is twisted and deformed	<ul style="list-style-type: none"> ● Check to see if the picture-frame ratio is properly set up.
Picture color changed or colorless	<ul style="list-style-type: none"> ● Check the "Component" or "RGB" settings of the liquid crystal TV set and make proper adjustment according to the

	signal types.
Picture too bright and there is distortion in the brightest area	<ul style="list-style-type: none"> ● Check if the contrast setting is too high. ● Possibly the output quality of DVD broadcaster is set too high. ● It maybe also due to improper terminal connection of the video frequency signal in a certain position of the system.
Picture is whitish or too bright in the darkest area of the picture	<ul style="list-style-type: none"> ● Check if the setting for the brightness is too high ● Possibly the brightness grade of DVD player (broadcaster) is set too high.
No picture or signal produced from the displayer if “XXX in search” appears.	<ul style="list-style-type: none"> ● Check if the cable is disconnected. ● Check if it's connected to the proper terminal or if the input mode is correct.
There appears an indication - “outside the receivable scope)	<ul style="list-style-type: none"> ● Check if the TV set can receive input signal. The signal is not correctly identified and VGA format is beyond the specified scope.
Remote control cannot work properly	<ul style="list-style-type: none"> ● Check if the batteries are installed in the reverse order. ● Check if the battery is effective. ● Check the distance or angle from the monitor. ● Check if there is any obstruct between the remote control and the TV set. ● Check if the remote control signal- receiving window is exposed to strong fluorescence.
No picture and sound, but only hash.	<ul style="list-style-type: none"> ● Check if the antenna cable is correctly connected, or if it has received the video signal correctly.
Blur picture	<ul style="list-style-type: none"> ● Check if the antenna cable is correctly connected. ● Of if it has received the right video signal.
No sound	<ul style="list-style-type: none"> ● Check if the “mute” audio frequency setting is selected. ● Check if the sound volume is set to minimum. ● Make sure the earphone is not connected. ● Check if the cable connection is loose.
When playing VHS picture search tape, there are lines at the top or bottom of the picture.	<ul style="list-style-type: none"> ● When being played or in pause VHS picture search tape sometimes can't provide stable picture, which may lead to incorrect display of the liquid crystal TV, In this case please press “auto” key on the remote control so as to enable the liquid crystal TV set to recheck the signal and then to display correct picture signal

2. Identification criteria for the bright spot and dark spot of the LCD screen

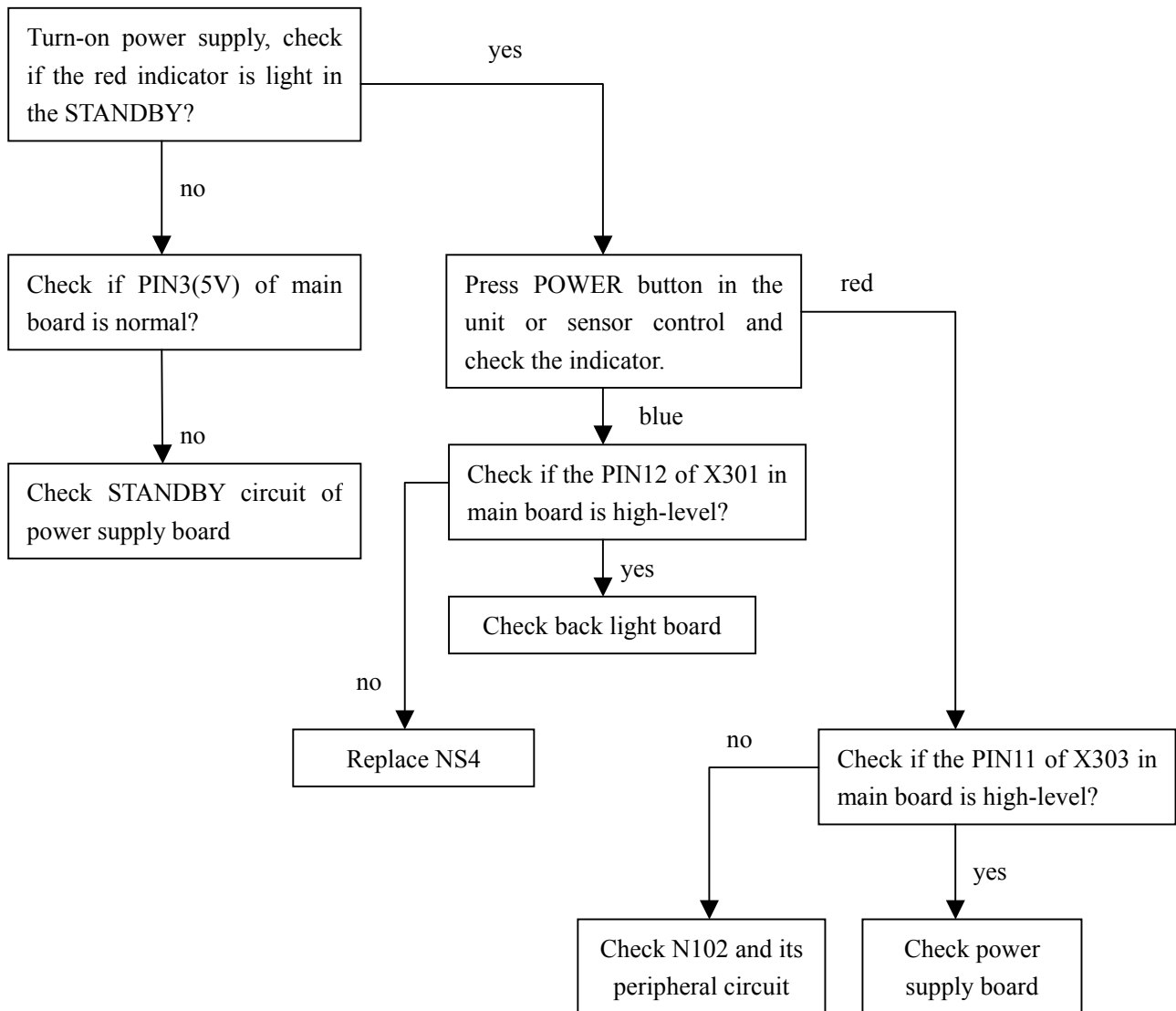
Category	Criteria	Quantity allowed					Distance between two spots				
		15"	20"	22"	30"	40"	15"	20"	22"	30"	40"
Bright spot	One single spot	≤5	≤2	≤5	≤2	≤3	≥15mm	≥15mm			
	Two neighboring spots	≤2	≤1	≤2	≤1	≤1					
	Total No.	≤5	≤2	≤5	≤2	≤3					
Dark spots	One single spot	≤6	≤7	≤5	≤4	≤10		≥10mm	≥5mm		
	Two neighboring spots	≤2	≤2	≤2	≤1	≤5					
	Total No.	≤6	≤7	≤5	≤4	≤10					
Total defected point		≤8	≤7	≤5	≤4	/					

Notes:

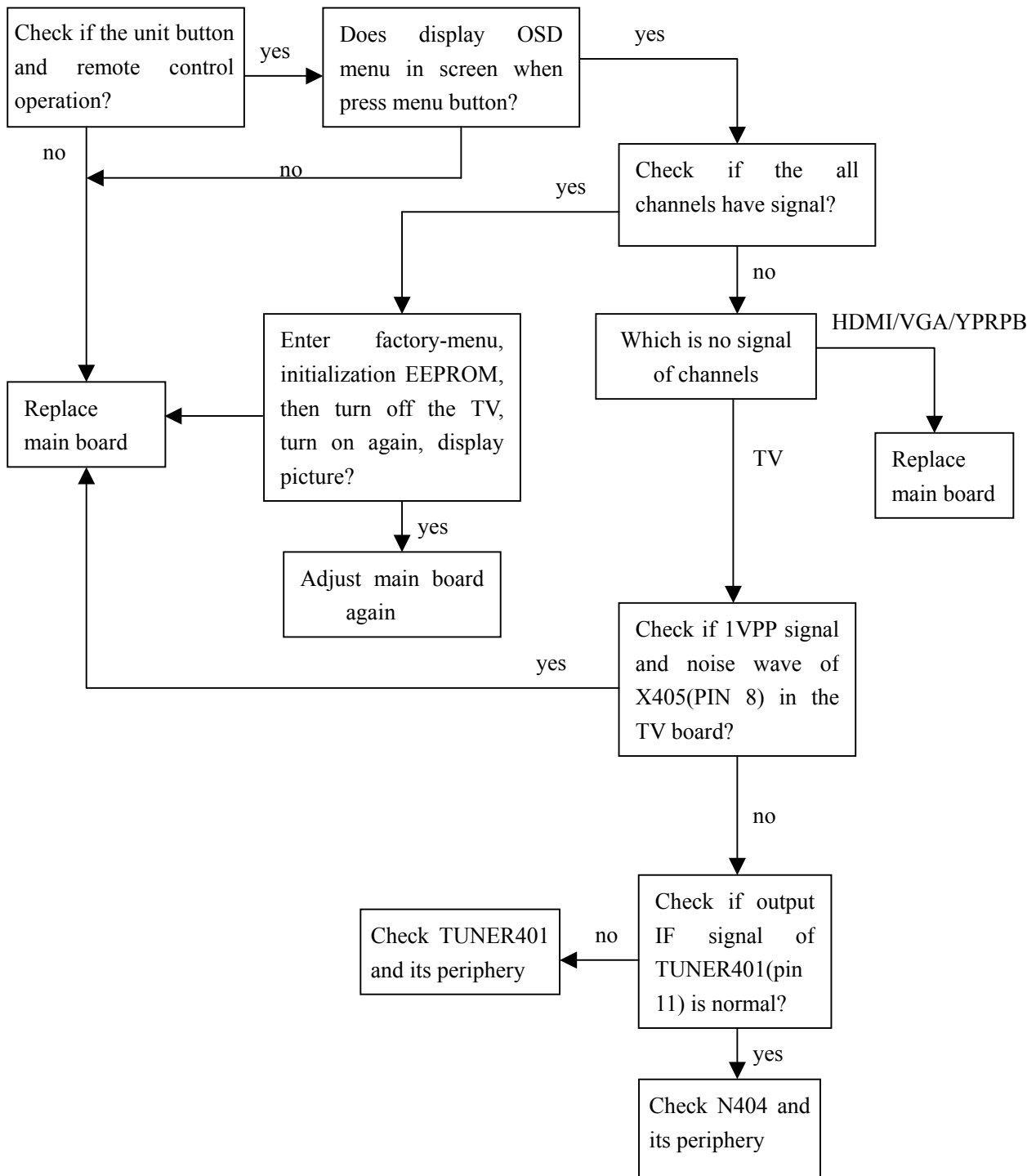
1. Definition of defected point (bright spot, dark spot): It is identified as a defected point if its area exceeds 1/2 of a single picture element (R, G, B).
2. Definition of bright spot: It is identified as a bright spot if it is bright in the state of dark field and its bright size remains unchanged
3. Definition of dark spot: It is identified as a dark spot if it is dark in the state of white field and its dark size remains unchanged
4. Definition of two neighboring points: Defects of a group of picture elements (RB, RG, GB).

3. Troubleshooting guide

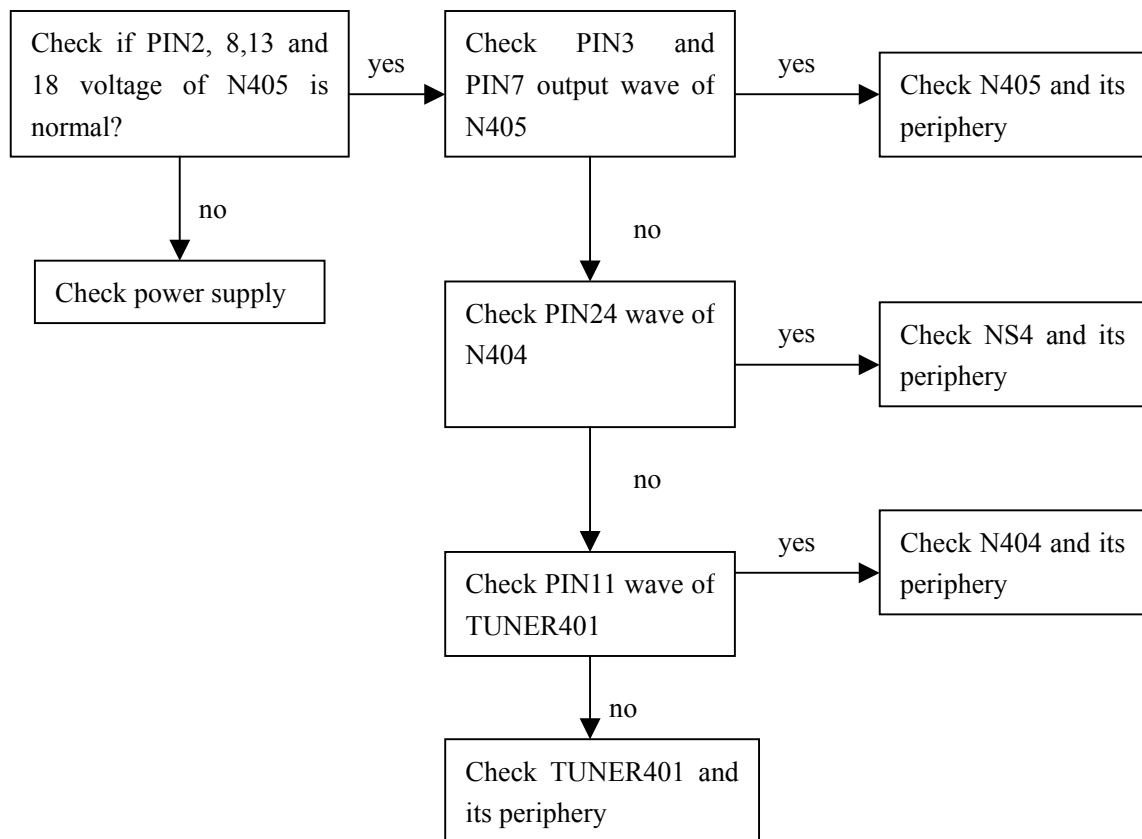
3.1. No raster

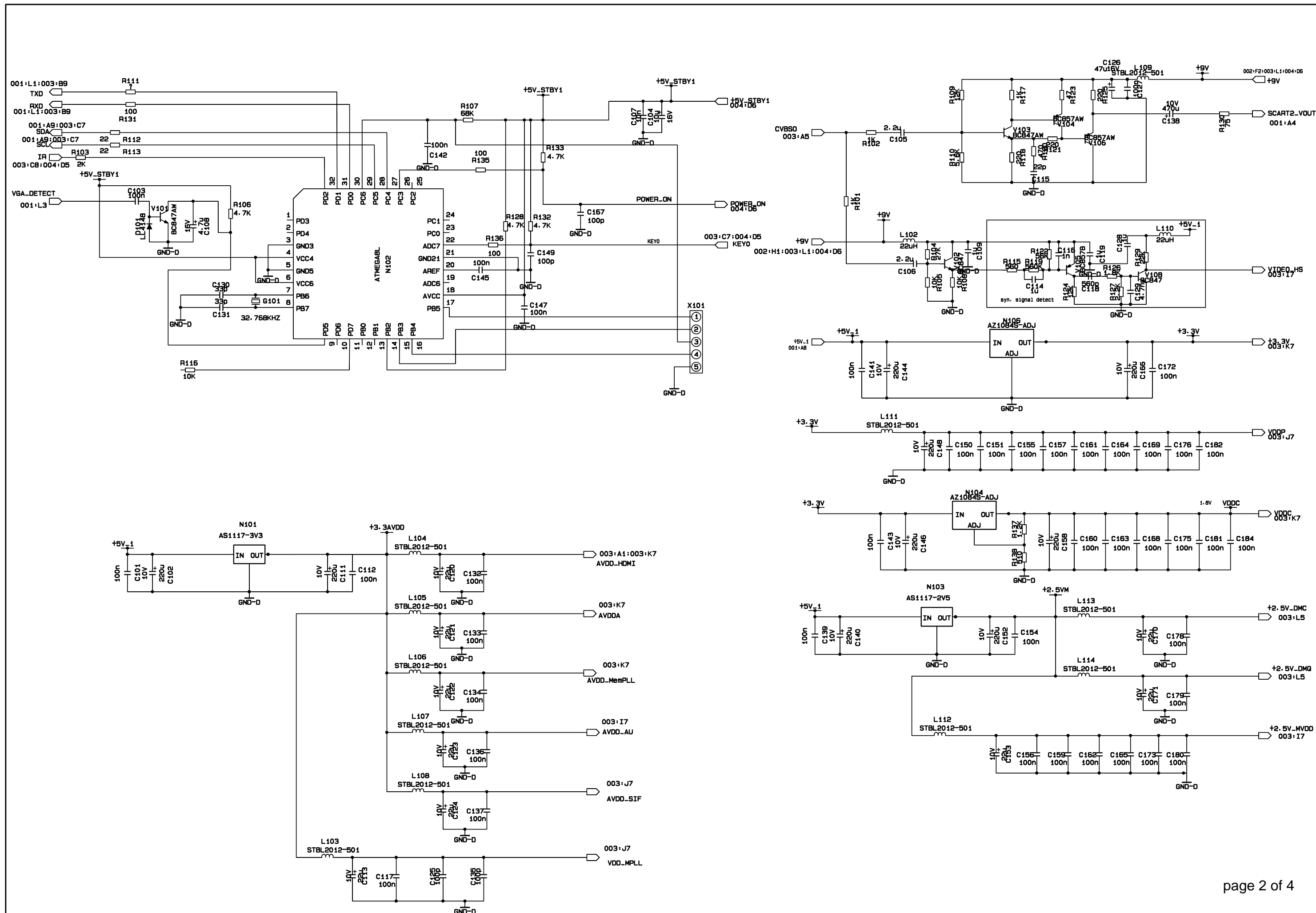


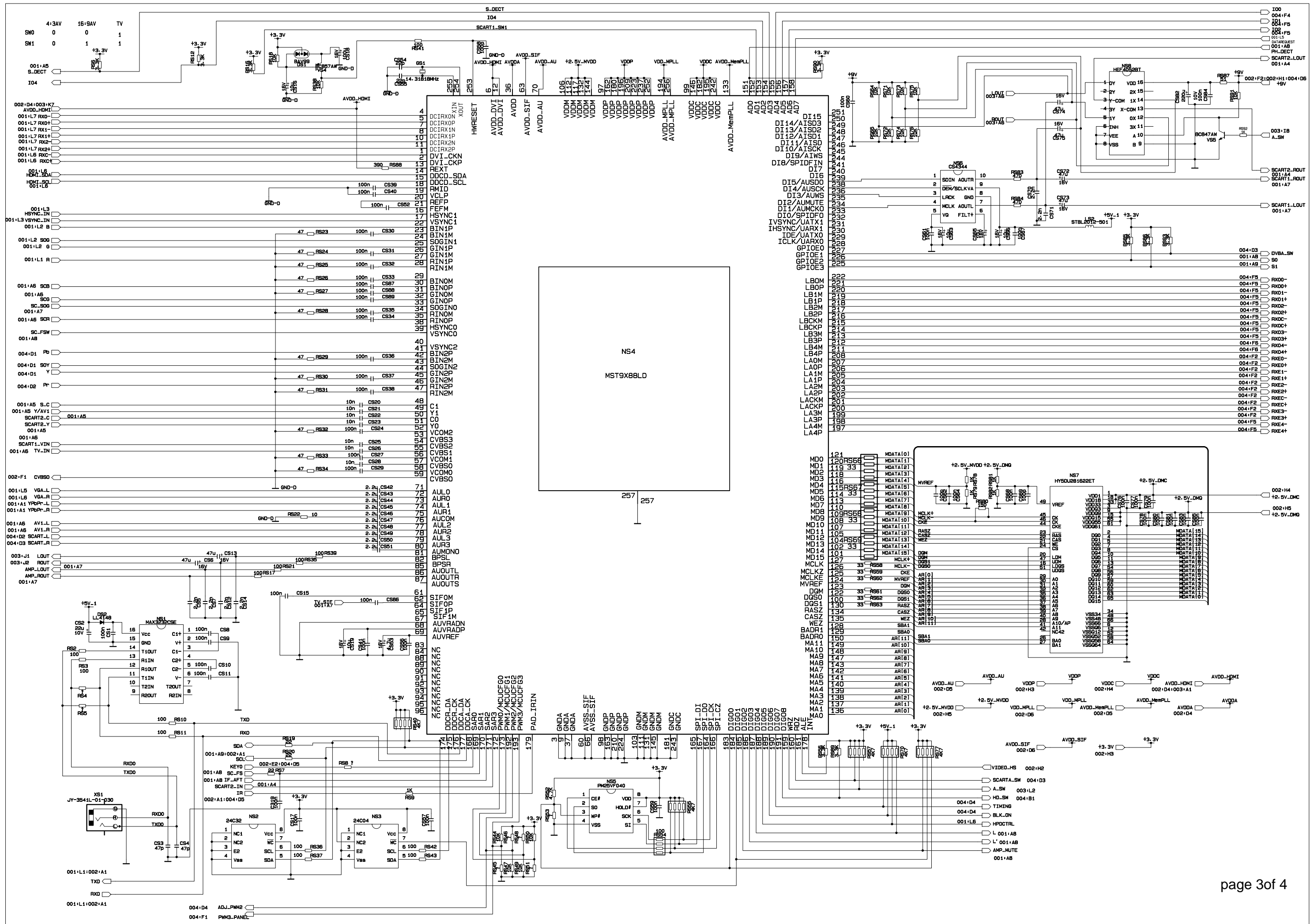
3.2. Raster, but no picture

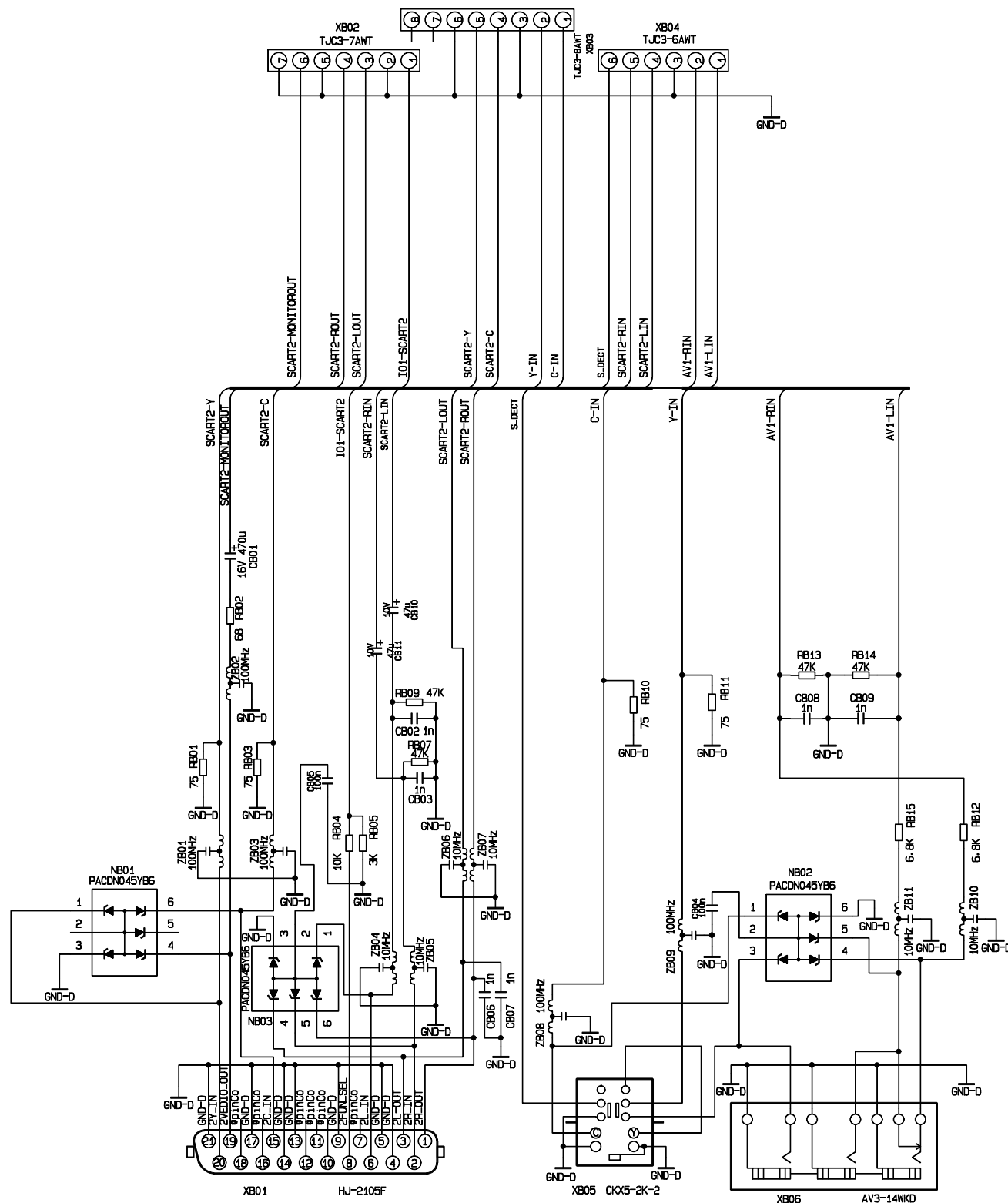


3.3.no sound









interface connector

A

B

C

D

E

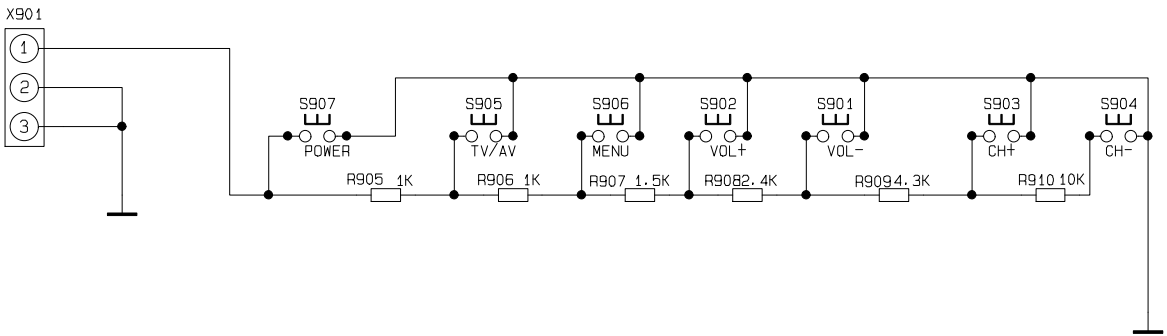
F

1

2

3

4



KEY board

A

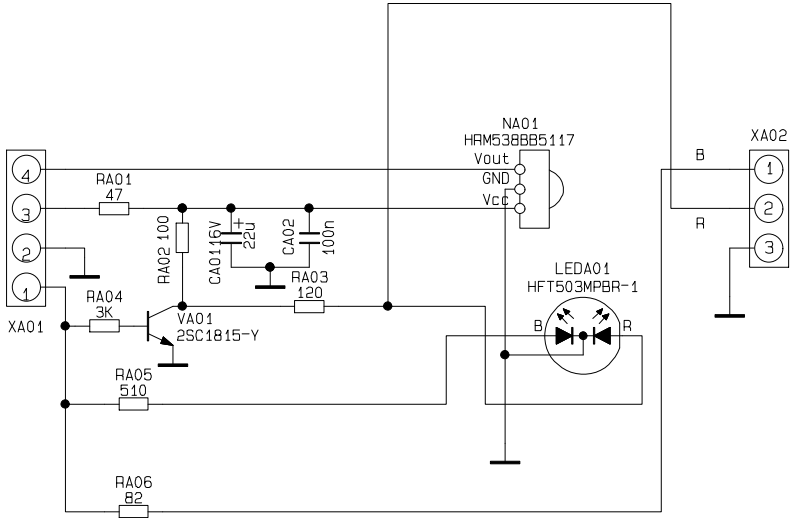
B

C

D

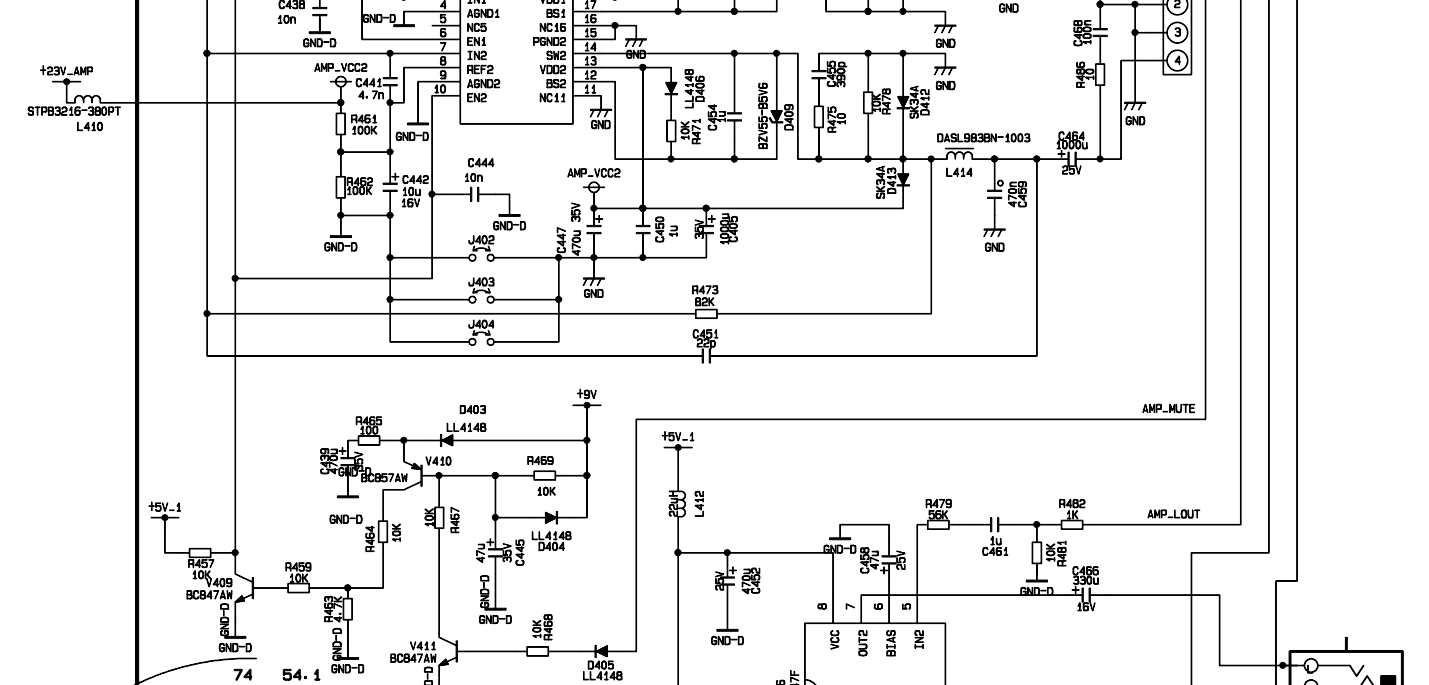
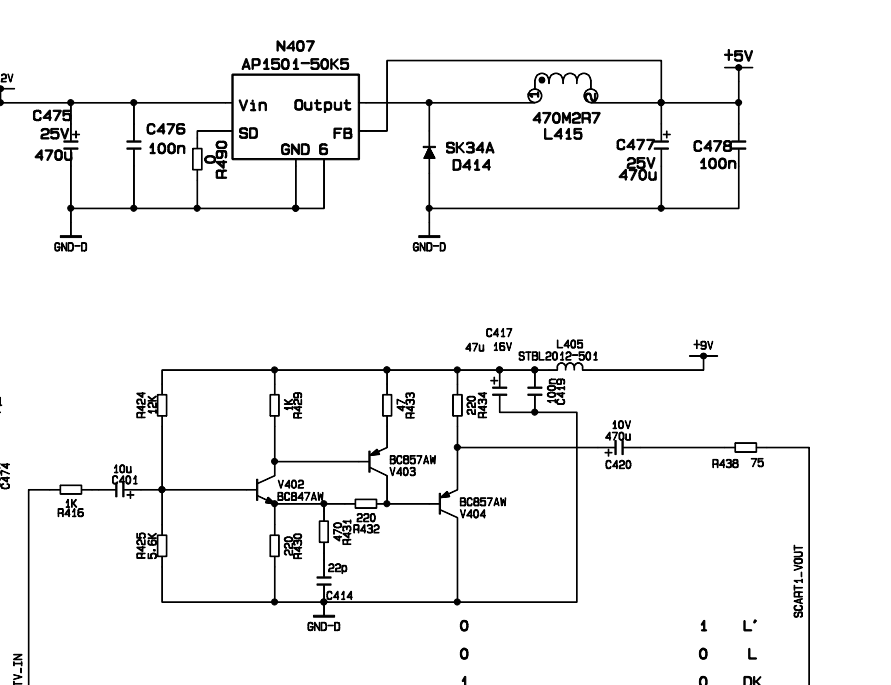
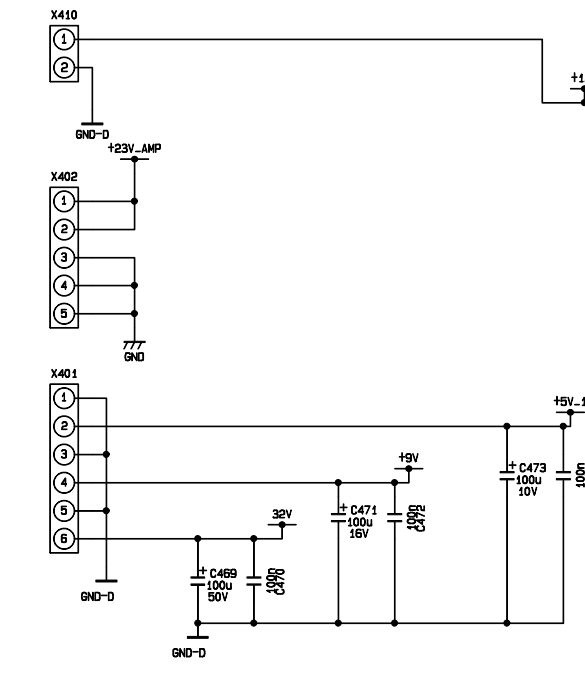
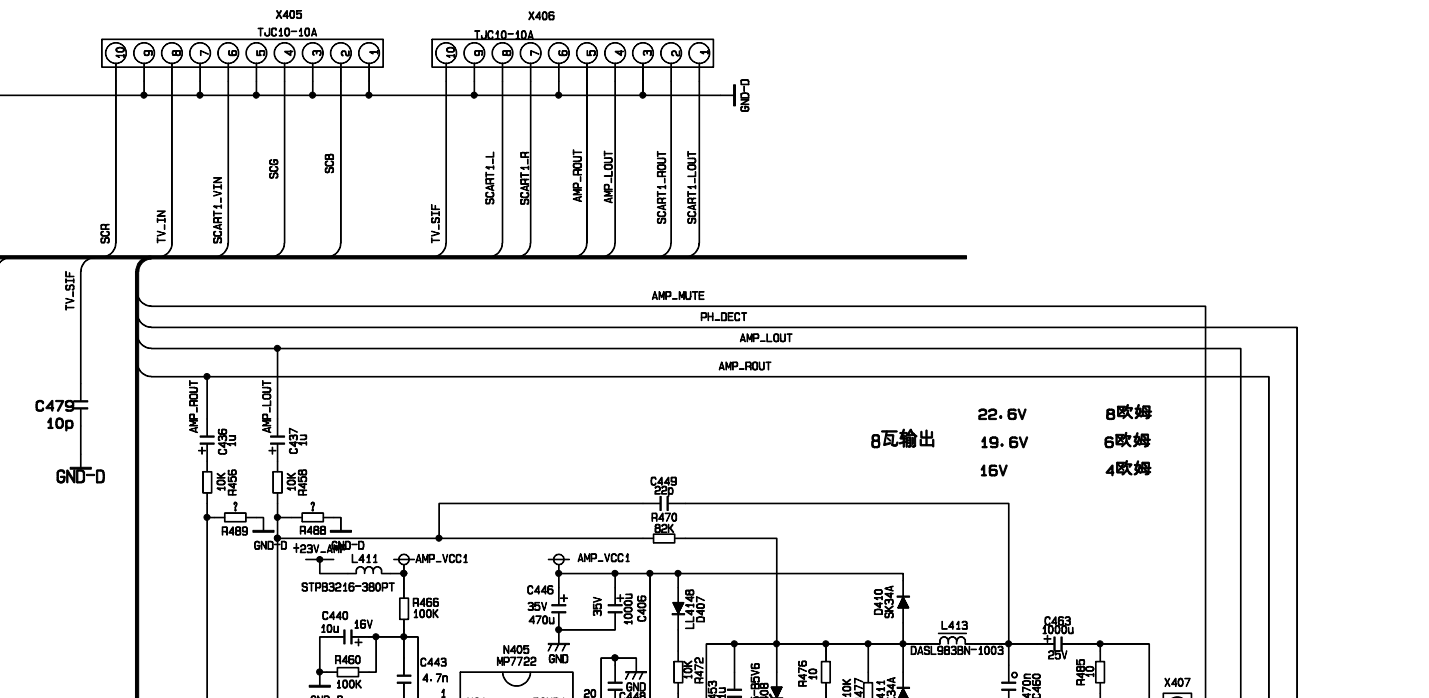
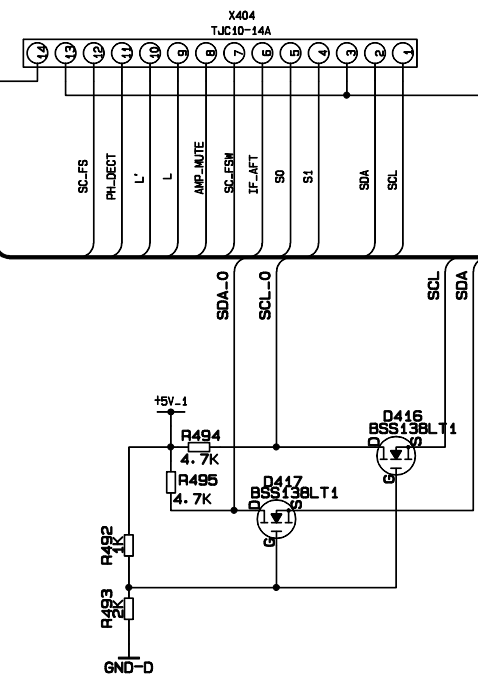
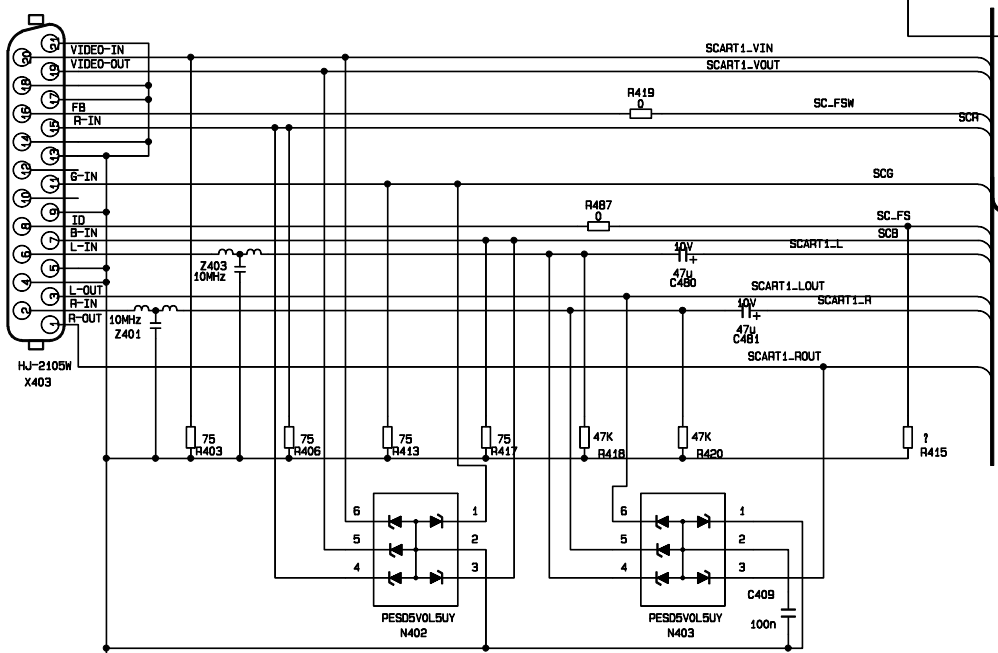
E

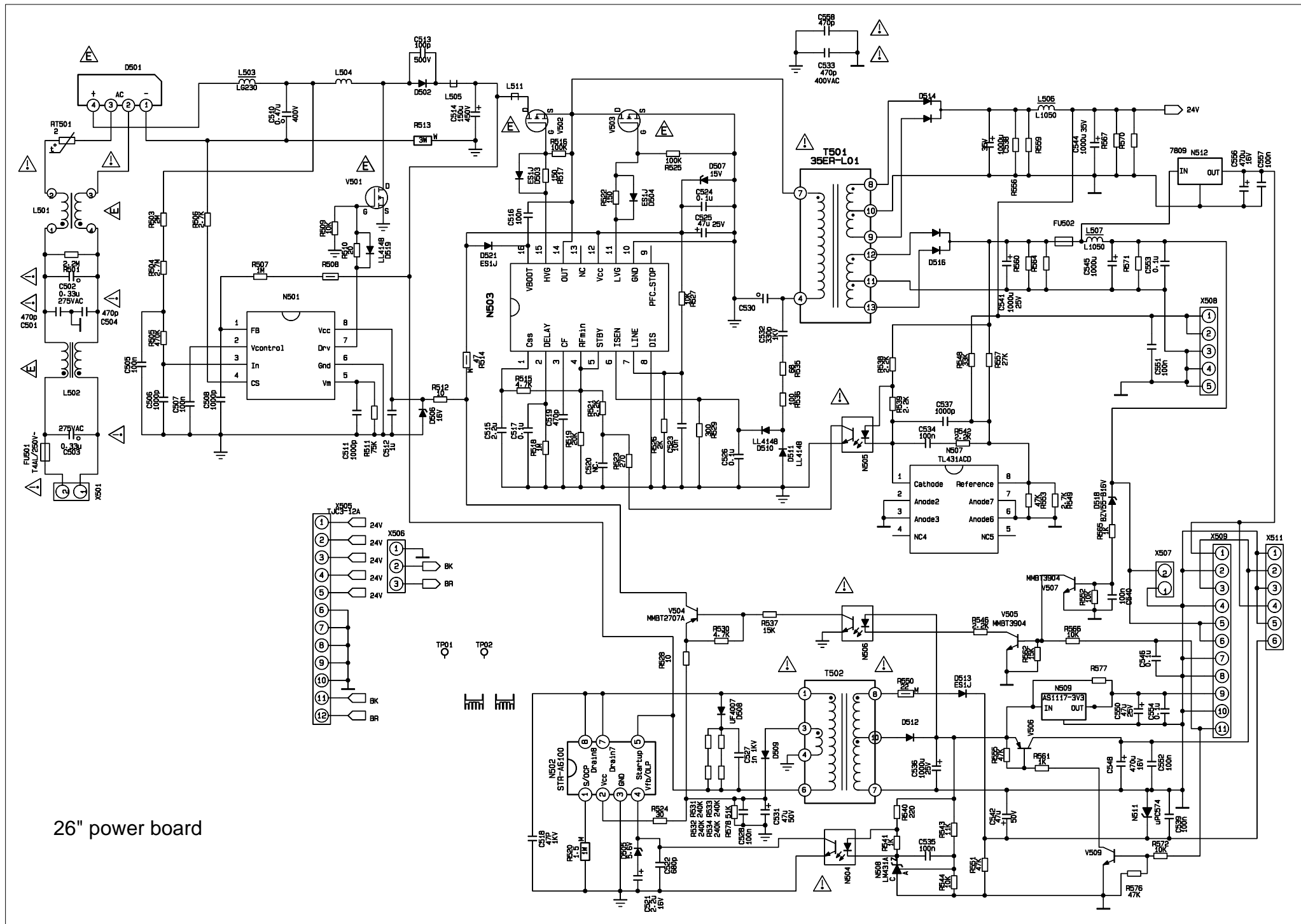
F



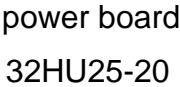
IR receiver board

SCART1 (CVBS+RGB) TV OUT





26" power board



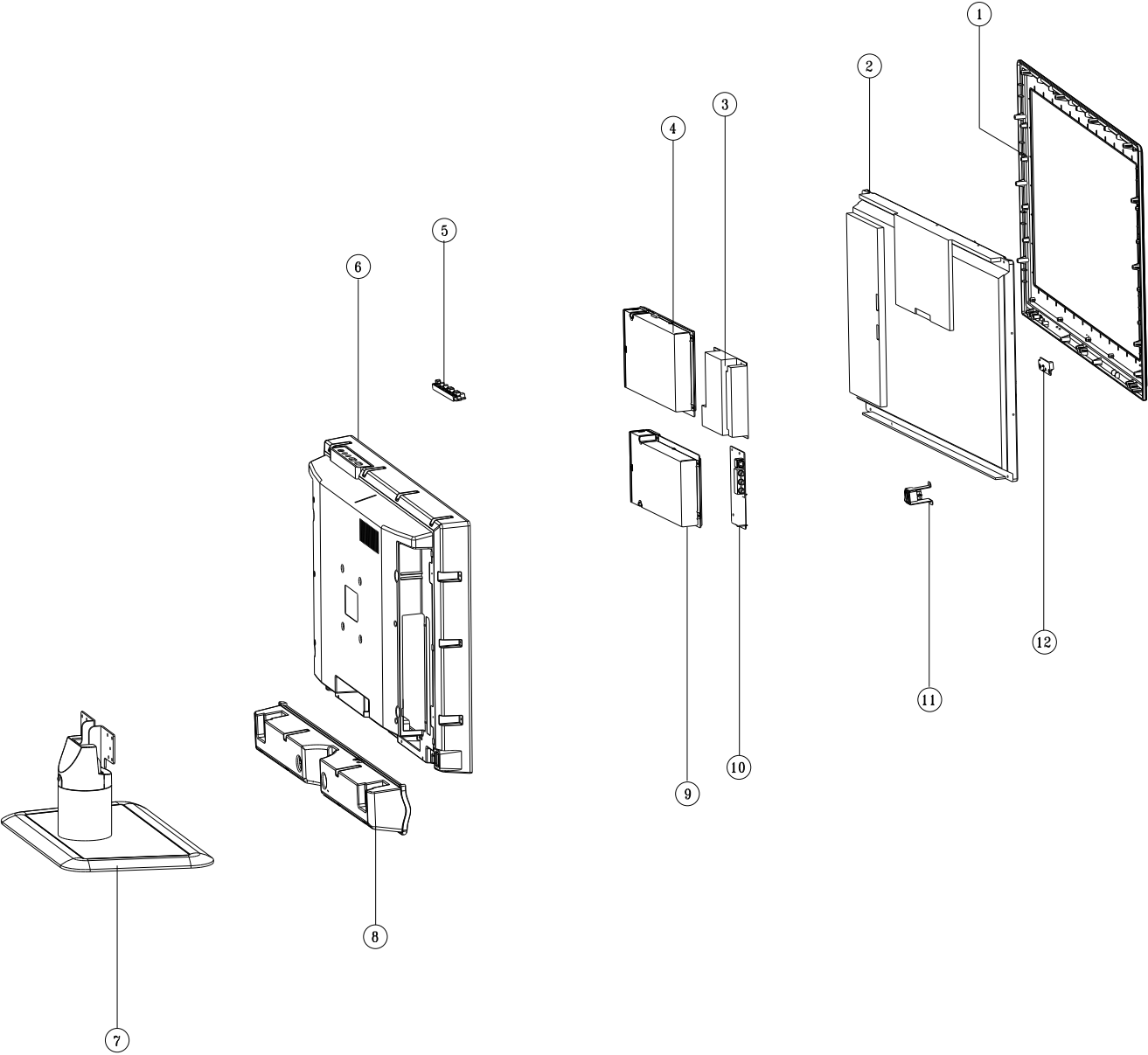
APPENDIX-A: Main assembly LCD-26XR7

NAME	NO.	MAIN COMPONENT AND IT'S NO.	
Analog board	XI6HU0495310	N404 N405	TDA4470 (5274470001) MP7722DF (5277722001)
Main board	XI6HU07001S0	NS4	MST9E88 (5270988002)
Interface board	XI6HU0212910		
Key board	XI6HU0230510		
IR receiver board	XI6FW0050910		
Power board	XI6HU0162010		
Remote control	XI6010Y03507	RC-Y35-0F	
Panel	XI5203265501	V260B1-L01 & L02	

APPENDIX-A: Main assembly LCD-32XR7

NAME	NO.	MAIN COMPONENT AND IT'S NO.	
Analog board	XI6HU0495310	N404 N405	TDA4470 (5274470001) MP7722DF (5277722001)
Main board	XI6HU04901S0	NS4	MST9E88 (5270988002)
Interface board	XI6HU0212910		
Key board	XI6HU0230510		
IR receiver board	XI6FW0050910		
Power board	XI6HU0212010		
Remote control	XI6010Y03507	RC-Y35-0F	
Panel	XI5203325506	V320B1-L04	

APPENDIX: Exploded view LCD-26XR7



PART LIST OF EXPLODED VIEW (LCD-26XR7)

NO.	DESCRIPTION
1	Front cover
2	Screen
3	Power board
4	Main board
5	Key board
6	Back cabinet
7	Stand
8	Speaker
9	Analog board
10	Trans-connecting board
11	Power swtich
12	Infrared receiving board
13	User manual
14	Remote Control

PARTS LIST

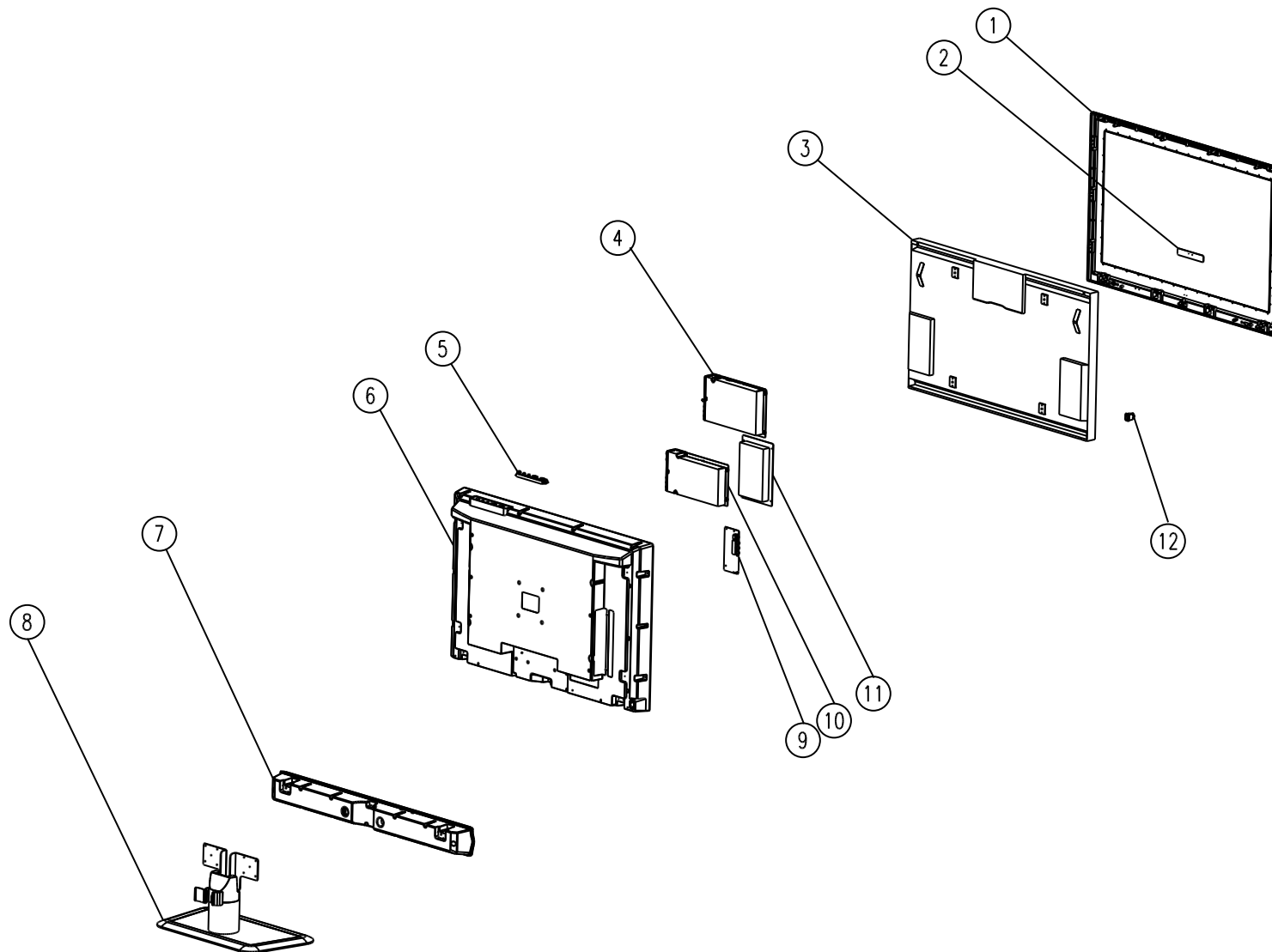
LCD-26XR7 ver.1.0

REF.No.	PARTS No.	DESCRIPTION	Q'TY	REMARK
1	XI5QX32W2010	Front Cover	1	
2	XI6FW0050910	Infrared Receiving Board	1	
3	—	Screen	1	CMO V260B1-L01 & L02
4	XI6HU07001S0	Main Board	1	
5	XI6HU0230510	Key Board	1	
6	XI5HX32WH03A	Back Cabinet	1	
7	XI6170699030	Speaker(Bottom)	1	
8	XI6151078830	Stand	1	
9	XI6HU0212910	Trans-Connecting Board	1	
10	XI6HU0495310	Analog Board	1	
11	XI6HU0162010	Power Board	1	
12	XI5293000042	Power Switch	1	
13	XI5944029010	User Manual	1	
14	XI6010Y03507	Remote Control	1	

* Only the parts in above list are used for repairing.

* Other parts except the above parts can't be supplied.

LCD-32XR7



PART LIST OF EXPLODED VIEW (LCD-32XR7)

NO.	DESCRIPTION
1	Front cover
2	Infrared receiving board
3	Screen
4	Main board
5	Key board
6	Back cabinet
7	Speaker
8	Stand
9	Trans-connecting board
10	Analog board
11	Power board
12	Power switch
13	User manual
14	Remote Control

PARTS LIST

LCD-32XR7 ver.1.0

REF.No.	PARTS No.	DESCRIPTION	Q'TY	REMARK
1	XI5QG32W202A	Front Cover	1	
2	XI6FW0050910	Infrared Receiving Board	1	
3	—	Screen	1	CMO V320B1-L04
4	XI6HU04901S0	Main Board	1	
5	XI6HU0230510	Key Board	1	
6	XI5HG32WH02A	Back Cabinet	1	
7	XI6170658030	Speaker(Bottom)	1	
8	XI6151077740	Stand	1	
9	XI6HU0212910	Trans-Connecting Board	1	
10	XI6HU0495310	Analog Board	1	
11	XI6HU0212010	Power Board	1	
12	XI5293000042	Power Switch	1	
13	XI5944029070	User Manual	1	
14	XI6010Y03507	Remote Control	1	

* Only the parts in above list are used for repairing.

* Other parts except the above parts can't be supplied.

